[ANARTS - Australian National Amateur Radio Teletype Society]

ANARTS NEWS BULLETIN 807 01/05/94.

SUNDAY Transmission Schedule.

3.545 MHz	0930 UTC	VK2BQS (Jim)
7.045 MHz -3	0030 UTC	VK2DPM (Alan)
14.070 MHz (amtor/fec)	0030 UTC	Not this week.
14.091 MHz	0030 UTC	VK2BQS (JIM)
146.675 MHz	0030/0930 UTC	VK2JPA (PAT)
144.850 MHz (ax25 bbs)		VK2JPA AT VK2RWI
146.675 MHz (rtty mmbbs/repeater)		VK2RTY

Views expressed in this news bulletin are not necessarily those of the Broadcast Officer, the Relay Officers, or of the Society.

GTOR (cont.)

Background Research

It occurred to us after porting Pactor into the KAM that this protocol did not go far enough. It did not incorporate any of the potential strengths prescribed by MIL-STD-188-141A. In addition, we knew that commercial and military systems use forward error correction (FEC) and data interleaving. So, we decided to evaluate the potential of using FEC coding with interleaving to increase data file transfer throughput with existing multi-mode TNCs such as the KAM and KAM-Plus.

We collected signatures of HF error patterns by sending Pactor idle characters through a DSP-based HF simulator. The simulator was programmed for various types of channels and conditions. In particular, we gathered error signatures by using the good, moderate, poor, and flutter fading channels prescribed by the CCIR (5) as recommended simulator test channels.

We then exclusive-ORed the error patterns with random data files on a PC and tested various coding schemes. Random data files were Golay encoded, interleaved, and then mutilated by the error signature. The process was then reversed; each file was de-interleaved, decoded and the data displayed. We were encouraged with the results so we moved on to the remaining major design tasks: designing a robust hybrid-ARQ protocol and determining whether or not the TNC could handle the necessary computing task!

A protocol evolved over time that met the challenge. We coded and ported it into the KAM Plus and conducted real-time tests using the HF simulator. Minor adjustments were made and we began on-the-air tests. G-TOR performed even better than our simulator predicted. Through a combination of coding and interleaving, G-TOR 'hung in there' even when interference appeared and signals were weak but readable.

G-TOR Frame Structure and Hybrid-ARQ Cycle

G-TOR operates as a synchronous hybrid-ARQ, see figure 1. Regardless of transmission rate, the cycle duration is always 2.4 seconds, data frames are 1.92 seconds long, and the acknowledgements take 0.16 seconds. At 300 baud, each data

frame contains 69 bytes of data, one control byte, and a two byte CRC. Frame makeup is noted in figure 2.

figure 1. G-TOR frame timing

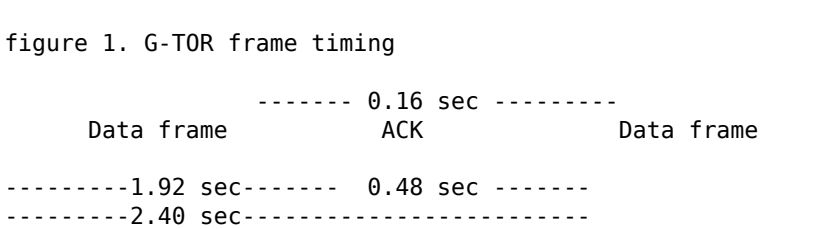
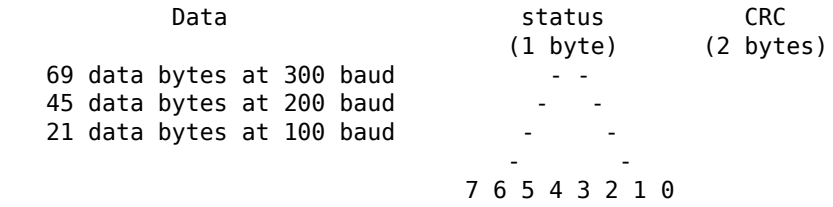


Figure 2. G-TOR frame structure before interleaving



To establish a link, the master station transmits the callsign of the intended receiver and the information receiving station (IRS) synchronizes to it. Once in step, it acknowledges such to the master and sends <link established> to its terminal. Transmission of data may then begin. Sufficient time is left between the end of the data frame and the start of the acknowledgement for propagation between stations over an HF path. The IRS changes its acknowledgement frame into a full-length data frame to effect a change in direction in information. Once the other station acknowledges this action, changeover is complete. Link quality, dictated by the number of consecutive good or bad frames received, determines link speed.

The effective performance of stations, while communicating over adverse HF channels, relies on the combined use of forward error correction, interleaving, and redundancy. These tools for improvement are incorporated in G-TOR within the firmware of the KAM-Plus (or KAM with enhancement board). We adopted an extended version of the (24,12) Golay code for G-TOR. the generator polynomial is

$$g(x) = x^{11} + x^{9} + x^{7} + x^{6} + x^{5} + x + 1$$

Procedures for data formation, transmission, reception, and data recovery are outlined below. Prior to transmission, 300 baud frames are divided into 48 12-bit words and matched with 48 error correction words of 12 bits each. The entire 72 byte data frame is then interleaved bit by bit, resulting in 12 bins of 48 bits, and transmitted . Upon reception by the IRS, the reverse process is carried out. The frame is synchronized, de-interleaved, decoded, and checked for proper CRC. If the frame is found to be in error, the IRS will request that the matching parity frame be sent. Upon receipt, the parity frame is used in combination with the data frame in an attempt of recover the original data bits. If unsuccessful, the ARQ cycle begins again. The dispersement of noise-burst errors via interleaving and the power of the Golay code to correct 3 bits in every 24 usually results in the recovery of error-free frames.

more next week

Editor's note : there is a critique of GTOR on the packet system at the moment. In the interests of amateurs who do not have access to packet, we will run this item following the completion of this review so as to have another viewpoint on this new system.

IPS weekly report

22 April - 28 April 1994

Issue No 17
Date of issue: 29 April 1994

INDICES:

Date	22	23	24	25	26	27	28
10cm	085	085	083	083	081	078	077
A	06	10	08	08	06	06	(05 estimated)
T	50	39	47	47	45	42	49

SUMMARY OF ACTIVITY

Solar activity was low on 22nd, and very low 23rd-28th April.

The geomagnetic field at Learmonth (WA) was quiet on 27th-28th April, and quiet to unsettled for the remainder of the period except for one active period on 23rd.

Ionospheric F2 critical frequencies at Sydney were near predicted monthly values throughout the period.

FORECAST FOR THE NEXT WEEK (29 - 5 May)

SOLAR: Very low to low.

GEOMAGNETIC: Unsettled to active on 29 April, active to minor storm levels thereafter.

IONOSPHERIC Near normal to 15 per cent below predicted monthly values.

Courtesy of IPS Radio and Space Services

VK2SG RTTY DX NOTES 22 APR 94

VK2SG RTTY DX NOTES FOR WEEKENDING 22 APRIL 1994 (BID RTDX0422)

Notes appear a little short this week, but with conditions as they have been and actually are, reports have been few. There has been very little activity, or maybe everyone was chasing on the bands to find some signal around. There is a good news for those looking for 9X5LJ. Jacques and his wife Monique are now in Belgium all safely.

Our thanks this week go to: ZS5S, W2JGR, WB2CJL, VK2SG, ON6RO, I5ICY, I5IGQ and IK5PWJ PacketCluster and the NJ0M node of the Twin Cities.

BANDPASS:
FRIDAY 15
1617-14091 9K2ZZ
1938-14084 CX3ABE

SATURDAY 16
1438-14086 LZ1KBB
1440-14088 A45XC
1440-14084 UT5DX
1536-21092 ZP6DN
1600-21070 S92ZM ARQ
1610-14084 S57U
1628-21070 S92ZM Pactor
1854-14084 ER1PE

SUNDAY 17
1329-14083 SV5AZP
(bad conditions)

MONDAY 18
0808-14088 OD5PL
0809-14090 UY0IO
1440-14089 LY2BBF
1506-21089 UN5GY
1633-14088 9H1ET
1655-14089 4L1BR
1720-14091 UN7LFO
2002-14087 HI8ROX
2317-14082 S92ZM
2331-14085 9A3TB

TUESDAY 19
0514-14066 VU2RAK ARQ
1709-14089 YY2KBB
1948-14084 CX7BF
2031-14092 FG5FI

WEDNESDAY 20
0750-14085 UX0KA
0736-14083 9H1ET
1154-14087 OH0NLP
1155-14085 ER2BP
1355-14087 YT70X
1732-14089 UT5DX
2055-7037 OH0NLP

THURSDAY 21
0812-04087 OH0NLP
1149-14085 UT5DX
1158-14083 RA2FB
1304-14083 GI4NIV

NOTES OF INTEREST:
DXAC VOTE RESULTS. The DXAC passed a recommendation to delete Walvis Bay (ZS9) and Penguin Islands (ZS0,1). Both countries became deleted effective date of March 1, 1994.

RTTY (FS RTTY). We mourn the loss of Harvey McCoy, W2IYX who became a silent key on 17 April 1994. Harvey was the "father"

of frequency shift RTTY (FS RTTY), having invented it for the U.S. military during World War II. All RTTYers owe him a debt of gratitude.

To those going to Dayton next week I wish a nice trip and lot of fun in the meeting and during the RTTY Dinner.

GL de (DX2) Luciano, I5FLN AT ZS5S.ZAF.AF

Coming events

1994

May 14th-15th Volta RTTY WW Contest

Society information

The Society may be contacted at : PO Box 860, Crows Nest 2065 Australia, for such matters as membership and general enquiries. Enquiries can also be made by packet to the President (Col) VK2CTD, or the Secretary (Pat) VK2JPA @ VK2RWI or whatever is the current substitute BBS.

News items may be sent to Broadcast Officer PO Box 60 Blacktown 2148 Australia, or by packet to VK2JPA as above.

Email address for the Broadcast Officer is :

patl@conmusic.pitt.su.oz.au

The Society welcomes news items on any digital subjects from anywhere in the broadcast footprint. We know we reach ZL and many South Pacific islands. We are looking forward to news from your areas to let other amateurs know what you are doing in the hobby. Hope to hear from you.

73s de Pat VK2JPA Broadcast Officer
That concludes ANARTS NEWS807 01/05/94.

Inserted by VK2BQS (Jim) Vice President ANARTS.

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